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Editorial Comment

Management of Ectopic Atrial Tachycardia*

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Atrial tachycardias are arrhythmias that do not require the atrioventricular node or ventricular tissue for their initiation or perpetuation and are distinguished from atrial fibrillation, atrial flutter and multifocal atrial tachycardia. Two general types have been observed. The first type can be both initiated and terminated by programmed stimulation and can be terminated by direct current shock. It is believed to result from intraatrial reentry and is often called *reentrant atrial tachycardia*. The other form cannot be initiated or terminated by programmed stimuli or terminated by direct current shock and is often referred to as *ectopic atrial tachycardia* and sometimes as *automatic atrial tachycardia*. However, the response to programmed stimulation is not a specific test of arrhythmia mechanism and it is possible that instances of automaticity, reentry and triggered activity occur in both forms of atrial tachycardia.

Present study. In this issue of the Journal, Prager and coworkers (1) report that pharmacologic management was effective in only 5 (33%) of 15 patients with ectopic atrial tachycardia, whereas operative methods were effective in all but 1 of 10 patients. Although these authors report a 90% success rate, an actuarial analysis would have provided more reliable values because the changing number of patients at risk would have been taken into account. In any case their study cannot be considered prima facie fair comparison of the two treatment methods because the patients could represent a distilled group of patients who did not respond to standard medical treatment before referral and because they may have been selected for a favorable surgical outcome through the exercise of good clinical judgment. Also, a vigorous attempt at medical control may not have been applied in all cases. For instance, not all patients received a sodium channel blocking agent, several patients underwent a trial of only one such agent and some patients did not receive treatment with such drugs as flecainide and amiodarone. However, because the poor response to pharmacologic treatment in this disorder is well known (2), one cannot be faulted for avoiding numerous trials of antiarrhythmic drugs.

Previous reports of surgical treatment. The excellent results reported by Prager et al. echo those of other series (3,4). Nevertheless, problems have occurred during operative management. For example, McGuire et al. (5) and Garson (6) noted frequent recurrences of arrhythmia in patients operated on for ectopic atrial tachycardia. Two patients treated surgically by Prager et al. (1) required reoperation, one for recurrence of the arrhythmia and another for constrictive pericarditis. Two patients required a permanent pacemaker. Fortunately, no deaths occurred but, in a previous series of patients operated on for supraventricular arrhythmias, Cox et al. (7) reported a mortality rate of 5%, a rate that might not be detected in a series of only 10 patients. Moreover, many patients with this form of tachycardia have reduced cardiac function, which increases the risk of surgical intervention. Thus, one of the patients described by Hendry et al. (8) died shortly after operation because of complications resulting from severe congestive heart failure.

Radiofrequency ablation versus surgical techniques. High rates of success also have been reported using radiofrequency energy directed by catheter (9–12). Walsh et al. (9) eliminated ectopic atrial tachycardia in 11 (92%) of 12 patients without major complications and with remarkable facility. Tachycardia usually vanished after radiofrequency energy was applied for 2 s (up to 13 s) and after an average of only 2 (range 1 to 11) full-duration applications of radiofrequency energy. More applications and longer durations were required in other series (10,12). Radiofrequency ablation would appear to have many advantages over surgery for treatment of this disorder because it avoids the morbidity, discomfort and cost of thoracotomy. In addition, it does not require general anesthesia or manipulation of the heart, which may temporarily suppress this noninducible arrhythmia (1,2) and prevent adequate intraoperative mapping or mimic successful elimination of the arrhythmia during the operation. Postoperative recurrence can be confused with sinus tachycardia (6) and can delay reoperation. In contrast, the success or failure of radiofrequency ablation is usually immediately apparent, but even when it is not, the risk of returning to the catheterization laboratory is low enough that a period of observation is possible in uncertain cases. The lesser obligation to eliminate ectopic atrial tachycardia in a single session may enhance safety by permitting less tissue damage and allowing greater flexibility in managing individual cases.

There are some curious discrepancies between accounts of the radiofrequency method and the surgical approach. The results of Walsh et al. (9) suggest that the arrhythmias they encountered arose from point sources that were readily eliminated by energy focused on a small area. One would expect the effectiveness of surgery to be as good or better given the higher resolution of operative mapping (direct visual guidance and multisite electrode arrays vs. catheter mapping guided by fluoroscopy) and the greater extent of damage (excision, isolation and cryoablation vs. radiofrequency energy at the tip of a catheter). However, operative failures have been thought to

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arise from diffuse disease and multiple sites of arrhythmia initiation (1,5), conditions that could foil catheter ablation as well. Therefore, important differences of the arrhythmia characteristics in the patients treated may account for the unexpectedly high success rate of catheter techniques. The single failure of Walsh et al. (9) supports this possibility and provides evidence that operative methods continue to have a role in the management of this disorder.

Role of pharmacologic therapy. Despite the success and appeal of catheter and operative ablation, efforts to improve pharmacologic therapy should not be abandoned because such treatment may be preferred in cases when prompt control is needed, the arrhythmia may be transient (13), invasive procedures are unsafe, multiple foci require suppression or new foci develop over months or years (1,5). Furthermore, reports of dramatic responses to a variety of antiarrhythmic agents such as flecainide (14), sotalol (15), verapamil (16) and adenosine (17) could justify a trial of pharmacotherapy in some patients. However, the limited overall response to drugs in current use suggests that new approaches may be required.

Different arrhythmia mechanisms probably exist among the arrhythmias classified as ectopic atrial tachycardia, but the similarity to sinus rhythm among some may have practical significance. Like sinus rhythm, the rate of ectopic atrial tachycardia may increase or decrease in response to alterations in autonomic activity (18–20); a similar resetting response has been observed in some cases (19) and both rhythms tend to have very robust pacemaker mechanisms that respond minimally to conventional antiarrhythmic drugs. The two rhythms may also have a common ancestry: The sinus node develops in association with vascular structures at the venous end of the primordial cardiac tube (21), whereas many cases of ectopic atrial tachycardia appear to arise in association with vascular tissue such as the pulmonary veins (2). Thus, the pacemaker processes may be descendants of spontaneous electrical activity that occurs in some veins (22). It may therefore be possible to use readily available sinus node preparations and mathematic models of sinus rhythm to develop antiarrhythmic drugs to control ectopic atrial tachycardia. Furthermore, complete suppression is not necessary if the rate of ectopic atrial tachycardia can be lowered to physiologic levels.

Implications. The correct approach in a given case must be based on the characteristics of the individual patient, the short-term and long-term safety and costs of the various methods and the expertise that is available. Beyond these usual considerations it is tempting to recommend catheter ablation as the therapy of first choice given the low yield and potential dangers of long-term therapy with available antiarrhythmic drugs and the greater morbidity associated with operative treatment. However, the experience with radiofrequency catheter ablation for this indication is limited and current published accounts may not reflect wide application of the technique. There remains a need for other therapeutic options and in this regard Prager and colleagues are to be congratulated for their perseverance in developing the operative approach. We look forward to new information from their sophisticated intraoperative studies that may lead to improvements in all modes of therapy.

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